REMARKS

Applicant incorporates in this amendment the amendment filed on November 21, 2005, the merits of which were not considered by the Examiner due to non-compliance for the reasons indicated in the Notice of Non-Compliant Amendment dated February 24, 2006.

Applicant acknowledges with appreciation the courtesies extended by Examiner Roy to the undersigned and Geneveve Cuaycong during separate telephone interviews on February 24, 2006.

Claims 1-9 and 11-31 are presented for examination. Claim 10 has been canceled, and its recitations incorporated into Claim 1; this action is taken without prejudice or disclaimer of subject matter. No new matter has been added. Claims 1, 27, and 31 are in independent form. Favorable reconsideration is requested.

Claims 1-3, 5-9, 12-20 and 23-31 were rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,816,564 ("Charles, Jr. et al."). Claims 1-4, 12, 23, 27, and 31 were also rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,711,432 ("Krause et al."). Claim 4 was rejected under 35 U.S.C. §103(a) as being unpatentable over Charles, Jr. et al. in view of Krause et al. Claims 10, 11, 21, and 22 were rejected under 35 U.S.C. §103(a) as being unpatentable over Charles, Jr. et al. in view of U.S. Patent No. 6,560,476 ("Pelletier et al.").

Claim 1 is directed to a method for preparing a virtual three-dimensional representation of a first portion of a bone. The method includes obtaining, from a first orientation with respect to the first portion of the bone, first image data of the first portion of the bone, obtaining, from a second, different orientation with respect to the first portion of the bone, second image data of the first portion of the bone, and generating a three-dimensional (3D) virtual representation of the first portion of the bone. The method also includes displaying the 3D virtual representation of the first portion of the bone. The displayed 3D virtual representation has an orientation. The orientation of the displayed 3D virtual representation is determined using at least the difference between the first and second orientations from which the first and second image data were obtained. The displayed 3D virtual representation also has a lower symmetry than the first portion of the bone.

Features of claim 1 are that the orientation of the displayed 3D virtual representation is determined using at least the difference between the first and second orientations from which the first and second image data were obtained, and that the displayed

3D virtual representation has a lower symmetry than the first portion of the bone.

Charles, Jr. et al. apparently relates to dual-energy x-ray absorptiometry for tissue properties, and to techniques for deriving bone structure, bone strength, and risk of injury, including risk of fracture, from multiple projection dual-energy x-ray absorptiometry images. In particular, the Charles, Jr. et al. reference discloses a technique for deriving bone properties from several x-ray images of a bone. (See Charles, Jr. et al. at col. 2, lines 64-67). The reference teaches that several x-ray images of a bone can be taken at various projection angles, and a three-dimensional computer model of the bone can be generated. (*Id.* at col. 10, lines 20-25). The 3D model can then be used to determine bone mineral content and mass, which can be further used to evaluate bone injury, such as breakage. (*Id.* at col. 17, lines 10-12).

The Examiner in the Response to Arguments section of the Office Actions states that Charles, Jr. et al. teaches that the orientation of the 3D representation is determined using the difference between orientations of the images (col. 21, lines 45-67). Applicant respectfully disagrees. The cited passage merely discusses comparing images in a particular plane to determine the risk of injury. The images compared are those currently taken with those taken at a previous time - days, months, or years earlier. Any differences noted would indicate abnormalities or difference in bone strength. The cited passage is silent with regards to determining the orientation of the 3D representation using at least the difference between the first and second orientations from which the first and second image data were obtained, as recited in claim 1. Further, Applicant has found nothing in Charles, Jr. et al. that would teach or suggest that the orientation of the displayed 3D virtual representation is determined using at least the difference between the first and second orientations from which the first and second image data were obtained, as recited in claim 1.

As noted above, Applicant has amended independent claim 1 to include the recitation of claim 10, that the displayed 3D virtual representation has a lower symmetry than the first portion of the bone. The Office Action rejected claim 10 under 35 U.S.C. § 103(a) as being unpatentable over Charles, Jr. et al. and Pelletier et al.

Applicant submits that a *prima facie* case of obviousness has not been made out as to claim 10 (now incorporated into claim 1). A *prima facie* case of obviousness requires that three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference(s) or to combine reference teachings.

Second, there must be a reasonable expectation of success. Finally, the prior art references when combined must teach or suggest all the claimed limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on the Applicant's own disclosure (M.P.E.P. § 2143). Further, if the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959).

Pelletier et al. apparently relates to tracking disease progression using magnetic resonance imaging. The Pelletier et al. method compares segmented images in the surfaces of joints with previous images to detect a difference. Charles, Jr. et al., however, uses dual-energy x-ray attenuation images, not magnetic resonance imaging, for determining bone properties. Applicant submits that there is no suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the references or to combine reference teachings of Charles, Jr. et al. and Pelletier et al. Although, both references deal with the broad concept of imaging, there is no motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to combine the teachings of magnetic resonance imaging with that of a dual-energy x-ray absorptiometry apparatus.

Thus, if Charles, Jr. et al. is modified in the way suggested by the Office Action, this would impermissibly change the principle of operation of Charles, Jr. et al. Applicant respectfully submits, therefore, that a *prima facie* case of obviousness has not been made out.

Further, Applicant respectfully disagrees with the assertion that Pelletier et al. discloses a method of preparing a virtual three-dimensional representation of a bone with the 3D representation comprising a cylindrical portion. The passage cited by the Office Action, col. 6, lines 8-30, merely states that the Pelletier et al. system can further include a display module responsive to the projection module to display the two dimensional surface on a planar display. The anatomical feature can include at least the condyles of the femur with the surface being cylinder and the plateau regions of the tibia with a surface being a plane. That is, as depicted in Figure 8 of Pelletier et al., once the data set has been segmented, the system fits a simple geometrical primitive to the 3D active contour results from the bone-cartilage interface. The primitive is chosen to mimic the shape of the bone surface. A cylinder is used

for the femur and planes are used for the tibia and patella (col. 13, lines 16-22). As clearly stated in Pelletier et al., the primitive mimics the shape of the bone surface and is not a virtual 3D representation of the bone. Applicant has found nothing in Pelletier et al. that would teach or suggest the displayed 3D virtual representation having a lower symmetry than the first portion of the bone, as recited in claim 1.

Applicant submits that a combination of Charles, Jr. et al. and Pelletier et al., assuming such combination would even be permissible, would fail to teach or suggest the displayed 3D virtual representation having a lower symmetry than the first portion of the bone, and that the orientation of the displayed 3D virtual representation is determined using at least the difference between the first and second orientations from which the first and second image data were obtained, as recited in claim 1. Accordingly, Applicant submits that claim 1 is patentable over the Charles, Jr. et al. and Pelletier et al.

Independent claims 27 and 31 include, among other things, the feature that the virtual representation has a lower symmetry than the first portion of the bone, which is substantially similar to that recited in claim 1. Claims 27 and 31 are believed to be patentable over Charles, Jr. et al. (and Pelletier et al.) for reasons substantially similar as those discussed above in connection with claim 1.

Independent claim 1 was also rejected as being anticipated by Krause et al.

Krause et al. apparently relates to implementing computer-aided surgical procedures, and more specifically relates to implementing a computer-aided orthopedic surgery utilizing intra-operative feedback. In the Krause et al. system, a computer database includes one or more template bone models. Multiple x-rays of an incorrectly aligned bone are taken and used to "morph" or modify a stored template bone model to create a 3D model of the misaligned bone.

The Office Action asserts that Krause et al. discloses a method and apparatus to prepare a virtual three-dimensional representation of a first portion of a bone with the system comprising a processor in communication with a display device to obtain a first image data of the first portion of the bone from a first orientation, obtaining a second image data of the first portion of the bone from a second orientation, generating a three dimensional virtual representation of the first portion of the bone, and displaying the 3D representation of the bone with an orientation determined from the difference between the first and second image data. The Office Action, however, is silent with respect to Krause et al. disclosing that the virtual representation has a lower symmetry than the first portion of the bone. Applicant has

found nothing in Krause et al. that would teach or suggest the virtual representation has a lower symmetry than the first portion of the bone, as recited in claim 1.

Applicant also asserts that independent claim 1 of the present application is patentable over the Krause et al. because Krause et al. fails to disclose that a 3D virtual representation of a bone is displayed and the orientation of the displayed 3D virtual representation is determined using the difference between the first and second orientations from which the first and second image data of the bone were obtained, as recited in claim 1. The "morphing" software program of the Krause et al. system is used to alter, bend, or morph the selected template bone model in a way that causes projections 84, 86 of the template bone model 88 to more closely match the two-dimensional segmented bone images 80 from the patient's x-rays 83. In effect, the 3D template bone model 88 is reshaped to resemble the patient's actual bone 82. The result of this process is a computer-modeled 3D representation of the patient's bone. (col. 7, lines 9-20). Applicant has found nothing in Krause et al. that would teach or suggest that the orientation of the displayed 3D virtual representation is determined using at least the difference between the first and second orientations from which the first and second image data were obtained, as recited in claim 1.

Accordingly, Applicant submits that claim 1 is not anticipated by Krause et al., and respectfully requests withdrawal of the rejection under 35 U.S.C. § 102(e).

Independent claims 27 and 31 include, among other things, the feature that the virtual representation has a lower symmetry than the first portion of the bone, which is substantially similar to that recited in claim 1. Claims 27 and 31 are believed to be patentable over Krause et al. for reasons substantially similar as those discussed above in connection with claim 1.

The other claims in this application are each dependent from one or another of the independent claims discussed above and are therefore believed patentable for the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, however, the individual reconsideration of the patentability of each on its own merits is respectfully requested.

This Amendment is believed clearly to place this application in condition for allowance. Should the Examiner believe that issues remain outstanding, it is respectfully requested that the Examiner contact Applicant's undersigned attorney in an effort to resolve such issues and advance the case to issue.

In view of the above, Applicant respectfully submits that the present

application is in condition for allowance. A favorable disposition to that effect is respectfully requested.

Respectfully submitted,

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